WHAT IS CLAIMED IS:

1. A method of preparing a compound of formula

$$fac\text{-}[M(CO)_3(OH_2)_3]^+ \qquad (I)$$

wherein M is Mn, ^{99m}Tc, ^{186}Re or ^{188}Re,
comprising reacting a metal in permetallate form with carbon monoxide and a reducing agent, wherein said reducing agent comprises stannous ion.

2. The method of claim 1 wherein said mixture further includes a stabilizing agent.

3. The method of claim 1 wherein said reducing agent forms a stannous ion.

4. The method of claim 1 wherein said reducing agent is a stannous salt.

5. The method of claim 1 wherein said reducing agent is selected from the group consisting of $SnCl_2$, $SnCl_2 \cdot H_2O$, SnF_2, $SnBr_2$, $SnCl_2\,2H_2O$, SnI_2, and $SnSO_4$.

6. The method of claim 1 wherein said mixture further includes lactose.

7. The method of claim 1 wherein said mixture further includes pyrophosphate or gluceptate.

8. A method of preparing a compound of formula

$$fac\text{-}[M(CO)_3L_x]^n \qquad (II)$$

wherein:

M is Mn, ^{99m}Tc, ^{186}Re or ^{188}Re;

L_x is i) three monodentate ligands ii) one monodentate ligand and one bidentate ligand, or iii) one tridentate ligand; and

n is a charge of the ligand L_x increased with one + charge;

comprising reacting a compound of formula (I) prepared according to claim 1 with ligand L_x.

9. The method of claim 8, wherein the reaction with ligand L_x takes place in the presence of a halide or a halide-like salt.

10. The method of claim 9 wherein said halide-like salt is selected from the group consisting of acetates, phosphates and sulfates.

11. The method of claim 8 wherein L_x comprises an aminopolycarboxylate.

12. The method of claim 8 wherein L_x comprises a biologically active substrate selected from the group consisting of amino acids, peptides, proteins, sugars, small receptor binding molecules and body cells.

13. The method of claim 8 wherein said method is performed between about 20°C and 150°C.

14. The method of claim 8 wherein said method is performed at about 100°C.

15. The method of claim 11 wherein said aminopolycarboxylate ligand is selected from the group consisting of diethylenetriamine-pentaacetic acid (DTPA), ethylenediaminetetraacetic acid (EDTA), 1,4,7,10-tetraazacyclododecane-1,4,7,10-tetraacetic acid (DOTA), iminodiacetic acid (IDA), nitrilotriacetic acid (NTA), and triazacyclononanetriacetate.

16. The method of claim 11 wherein said ligand is not bidentate.

17. The method of claim 11 wherein said ligand is tridentate.

18. A kit for carrying out the method of claim 1, comprising a lyophilized formulation including stannous ion, wherein said stannous ion may be in the form of a discrete molecule comprising said stannous ion plus an anion, said mixture being sealed in a container having a headspace comprising carbon monoxide.

19. The kit of claim 18 wherein said headspace is substantially pure carbon monoxide.

20. The kit of claim 18 wherein said reducing agent forms a stannous ion.

21. The kit of claim 18 wherein said reducing agent is a stannous salt.

22. The kit of claim 18 wherein said reducing agent is selected from the group consisting of $SnCl_2$, $SnCl_2{\cdot}H_2O$, SnF_2, $SnBr_2$, $SnCl_2{\cdot}2H_2O$, SnI_2, and $SnSO_4$.

23. The kit of claim 18 wherein said reducing agent is $SnCl_2$.

24. The kit of claim 18 wherein said formulation further includes lactose.

25. The kit of claim 18 wherein said formulation further includes pyrophosphate or gluceptate.

26. The kit of claim 18 further including a metal M which is Mn, ^{99m}Tc, ^{186}Re or ^{188}Re.

27. A kit for carrying out the method of claim 8, comprising a lyophilized formulation including stannous ion, wherein said stannous ion may be in the form of a discrete molecule comprising said stannous ion plus an anion, and a metal M which is Mn, ^{99m}Tc, ^{186}Re or ^{188}Re.

28. The kit of claim 27 wherein said reducing agent is $SnCl_2$.

29. The kit of claim 27 wherein said formulation further includes lactose.

30. The kit of claim 27 wherein said formulation further includes pyrophosphate or gluceptate.

31. The kit of claim 27 further comprising a ligand L_x which is a multidentate aminopolycarboxylate ligand.

32. The kit of claim 31 wherein L_x is not a bidentate ligand.